Regency® COMMUNICATIONS INC.

SERVICE INSTRUCTIONS

TWO TONE SEQUENTIAL DECODER

MODEL MA-123

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SATELLITE BEACH, FLORIDA

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SERVICE INSTRUCTIONS
REGENCY MA-123
TWO TONE SEQUENTIAL DECODER

A. GENERAL DESCRIPTION

The Regency Two Tone Sequential Decoder(TTS) option is designed for use with tone controlled squelch systems where two tones are transmitted sequentially. It is available as a factory installed option or as a kit for Regency transceivers.

The MA-123 can be used as an all call decoder, as a selective call decoder or as both, depending on the tone filter frequencies selected.

The decoder block diagram is shown in Figure 2, parts layout in Figure 3, and schematic in Figure 4.

B. CIRCUIT DESCRIPTION (Refer to Figure 1 and Figure 3)

TONE RECEIVING CONDITION

The initial conditions in this mode is that the receiver is squelched, the message lamp is off, and the microphone is on-hook (microphone in the hang-up clip).

Audio enters at point AØ. Then is inputed to an audio amplifier at Pin 2 of IC1103 where it is amplified and outputed at Pin 1. The amplifier output is connected to three parallel reed filters.

These filters are electro-mechanical resonating devices. The output amplitude is determined by the resonant frequency of the filter element. This frequency is marked on each filter.

The filter outputs are divided into two groups. FL1101 is used for the detection of the first tone. FL1102 and FL1103 are used for the detection of either one of two second tones in the two-tone sequence.

The outputs of FL1102 and FL1103, like the output of FL1101, are amplified by two stages of amplification from IC1101. The amplified output of FL1101 can be seen on Pin 2 of IC1101, whereas the output of filters FL1102 and FL1103 can be seen at Pin 10 of IC1101.

Each of these amplified outputs are rectified and filtered. This supplies a DC level for the logic circuits to evaluate. When a tone corresponding to FL1101's resonant frequency is detected Pin 12 of IC1102 goes high(approx. 3 volts or greater), this logic signal is called TONE 1. If FL1102 or FL1103 detects a tone, the cathode of CR1104 will go high, this logic signal is called TONE 2.

The TONE 1 signal triggers a 2½ second one-shot. The one-shot is a discrete one-shot consisting of an R-C time constant, an OR gate, and an inverter. A high at Pin 12 of IC1102 causes Pin 11 to go low. This allows the uncharged C1109 to charge. The voltage at Pin 13 of IC1101 will go low when Pin 11 of IC1102 goes

low and will increase, corresponding to C1109 charging up. While Pin 13 of IC1101 is low the output, Pin 12, will be high. This output is fed back to the other input of the OR gate to hold Pin 11 of the gate low allowing C1109 to continue to charge and is also the output of the one-shot. This output is connected to one input of a 3-input and gate thru CR1109.

Besides firing a one-shot, the TONE 1 signal is also inverted creating the $\overline{\text{TONE}}$ 1 signal. This is connected to the second input of the 3-input and gate thru CR1103 and CR1108.

Finally, the TONE 2 signal is inputed to the third input of the 3-input and gate thru CR1108.

The 3-input and gate is formed by ½ of IC1103 and the diode arrangement of CR1103, CR1108 and CR1109 with a pull-up resistor, R1123. When all three inputs are high then Pin 5 of IC1103 will go high. With pins above the threshold voltage of 4V on Pin 6, the output(Pin 7) will be high.

Summarizing the decoding sequence, when the first tone is received a one-shot is triggered. If the second tone is then received with the one-shot output still high and the first tone not present, the output of the AND gate will go high. This output is available at point D9.

With the microphone on-hook, Pin 6 of IC1102 will be low. When the proper tone sequence is received, Pin 1 of IC1102 will go high, setting the S-R latch. This sets the latch with Pin 3, $\overline{Q}$ output, going low, and Pin 4, Q output, going high. When $\overline{Q}$ goes low Q1102 is turned off allowing K8 to go high. The Q output of the latch is available at point D1 and also turns on Q1101, which provides an open-collector output at DØ.

TRANSMITTING CONDITION

In this mode the microphone is off-hook (removed from hang-up clip). With the microphone off-hook the radio operates normally. Point K5 goes high, removing the ground from the emitter of Q1102, allowing the squelch circuit to operate normally. When K5 goes high it also resets the S-R latch, resetting the message lamp driven by DØ.

C. INSTALLATION

Plug the jumper kit onto the option board by matching the pin symbols with the sleeves on the wired receptacles (see Figure 3).

Mount the option board as shown in Figure 5, using the two sheet metal screws supplied (insert the screws from the foil side of the board).

Remove jumper JO205 from the radio. Insert the receptacles to the proper pins (see Figure 5) by matching the pin symbols in the radio with the sleeves on the wired receptacles.

Two TTS Decoder boards can be installed so the transceiver can decode up to four possible tone sequences. To accomplish this connect the first tone board as described above. Connect the second tone board, using the connecting pins supplied, as follows:

1) Connect a JO jumper from P1 in the radio to P1 on the second TTS board.

2) Connect a JO jumper from G in the radio to G on the second TTS board.

3) Connect the two AØ pins between the two decoders using a JO jumper.

4) Connect the two D9 pins between the two decoders using a JO jumper.

NOTE: Enough receptacles are supplied for the construction of the JO jumper assemblies for the optional variations of the option.

D. ADJUSTMENT PROCEDURE (No adjustments are necessary but the following performance should be observed.)

When the microphone hang-up button is not grounded the radio should operate normally. When the hang-up button is grounded the receiver will squelch and the message lamp will be off.

When a modulated signal, modulated with the correct tone sequence (described below), is received, the message lamp will illuminate and the receiver will operate normally.

PROPER TONE SEQUENCE:

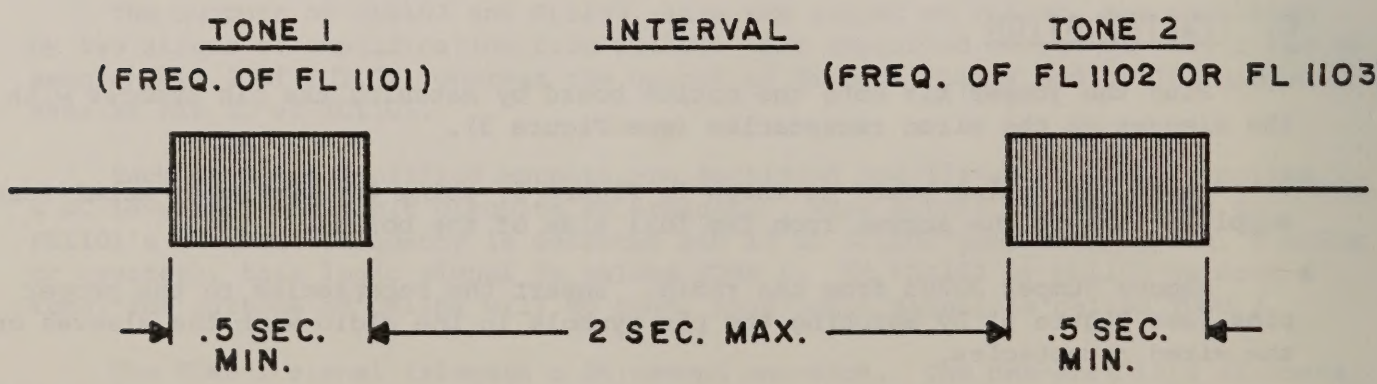


FIGURE 1

E. SPECIFICATIONS

Voltage Range	12-24 VDC
Current Drain	25ma max. (18ma typ.)
Frequency Range	300 Hz - 1050 Hz (Separated into selected frequency groups for Regency on-call systems. Three Frequency Groups: Z - Code, A - Code, B - Code
Bandpass	±.35%
Inputs	
AØ Audio Input	.2 - 1 VRMS
D9 Message Latch Set	5v max.(Set)
K5 Message Latch Reset	0v min. Open or 5v max.(Reset)
Outputs	
DØ Message Lamp Driver	30ma Sink max.
D1 Message Latch Q Output	1ma Source max.
D9 Decode Output(momentary)	10ma Source max.
K8 Squelch Control	.4ma Sink max.
Signal(Two Sequentail Tones)	
1st Tone Duration	Greater than .5 sec.
Interval Duration	Less than 2 sec.
2nd Tone Duration	Greater than .5 sec.
Sensitivity	6dB SINAD (max.)

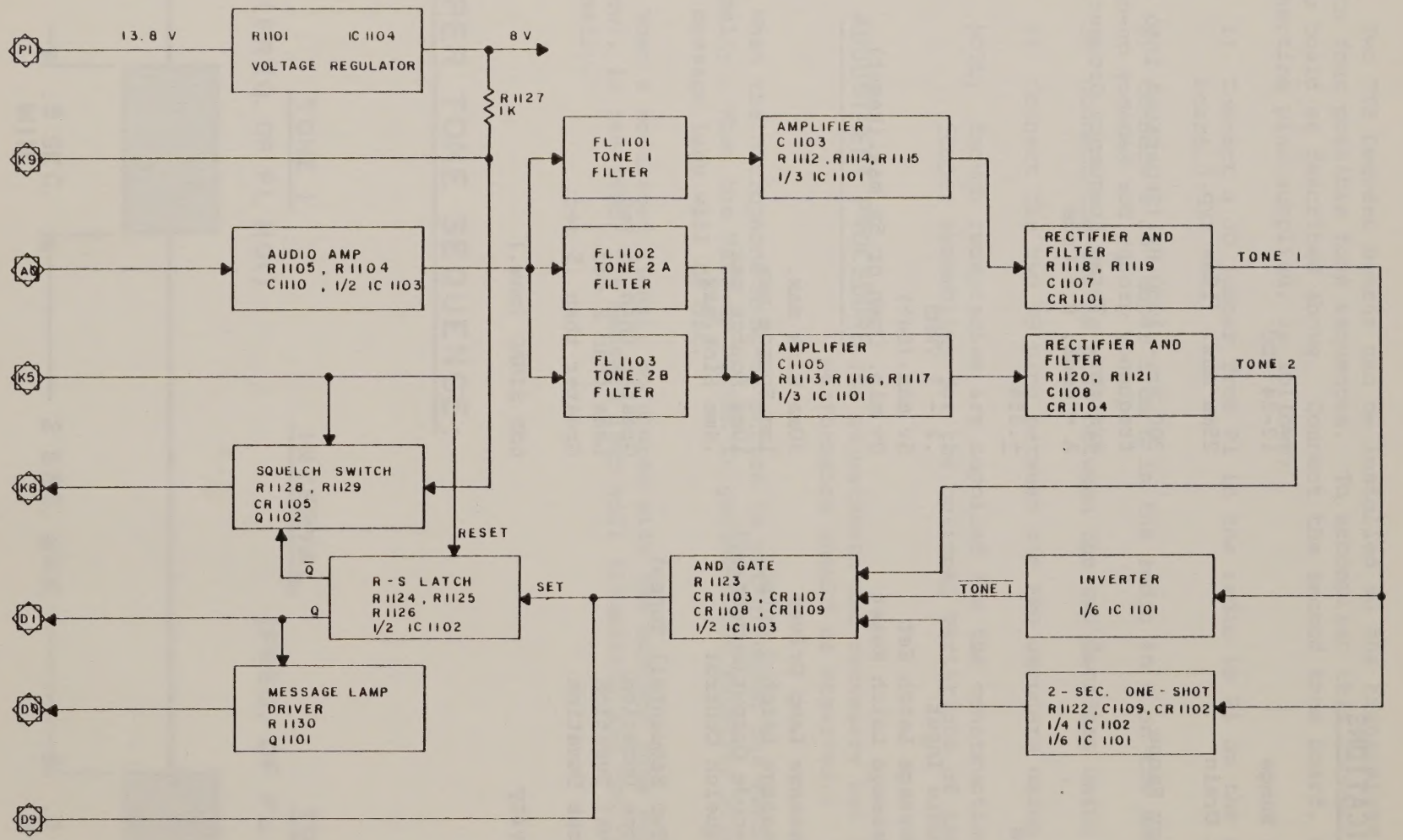


FIGURE 2

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A			

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACT ± DEC ± ANGLE ± .XX ± .XXX ±	APPROVALS	DATE
		MATERIAL	DRAWN JAB	1-10-83
		FINISH	CHECKED	
NEXT ASSY	USED ON		ENGR	
APPLICATION		DO NOT SCALE DWG.		

Regency COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937

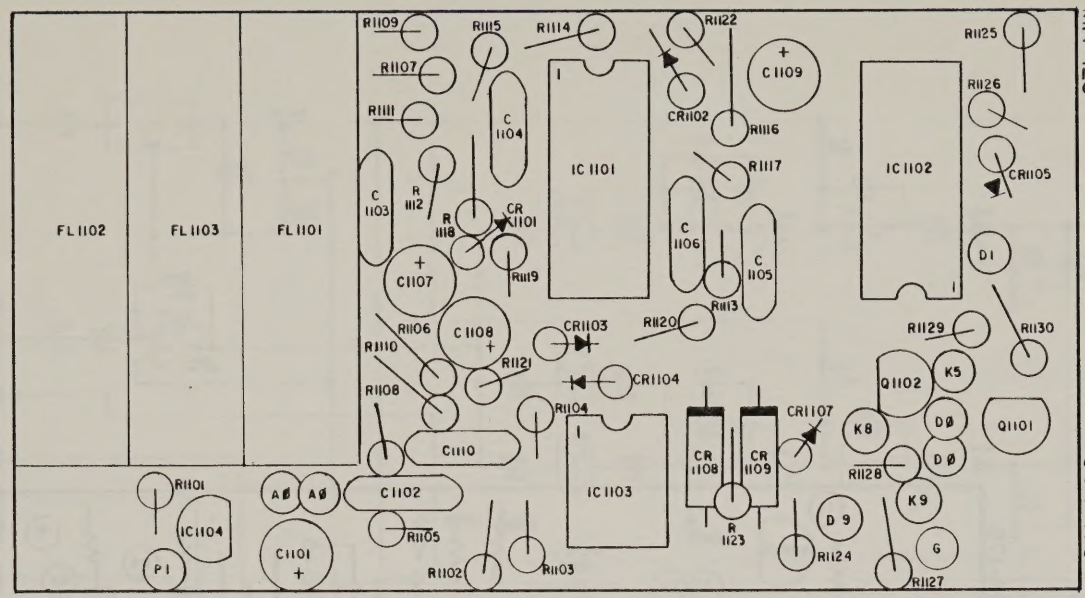
BLOCK DIAGRAM
[illegible] CODER

SIZE C | PART NUMBER 504-4 | REV A

SCALE | SHEET 1 OF 1

DWG NO | SH 1 | REV A

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A 2307



REV	CHANGE	DATE
A	2044	4-20-78

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REFERENCE: TTS DECODER MA 123

Regency ELECTRONICS INC. INDIANAPOLIS, INDIANA 46226

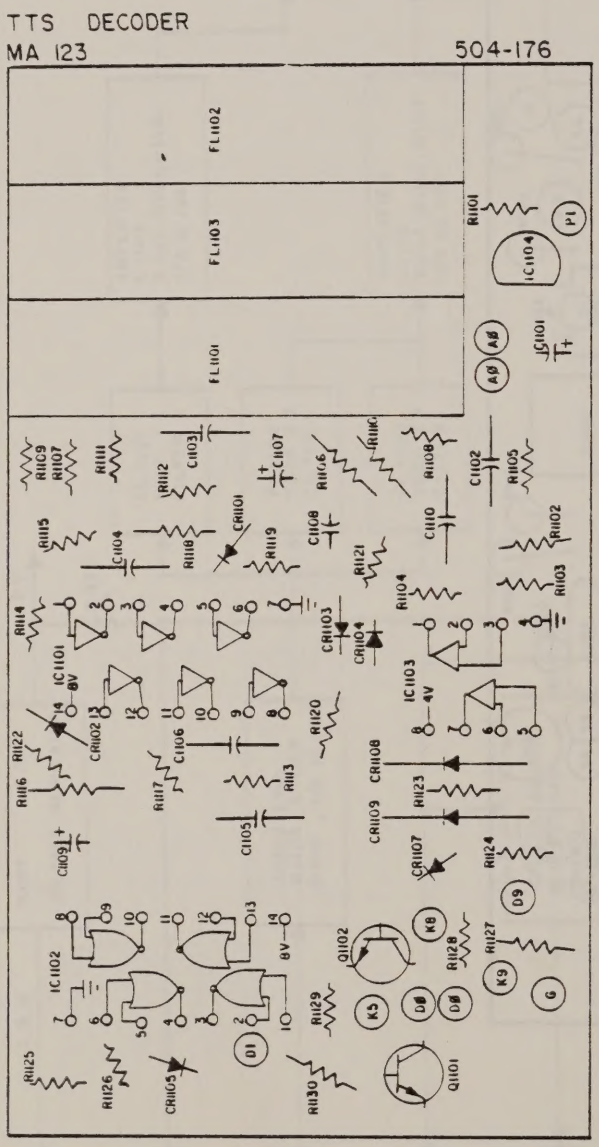
UNLESS OTHERWISE SPECIFIED
DEC ± FRACT ± ANGLES ±
SCREW THREADS - AMERICAN NATIONAL CLASS

SCALE	DRAWN	CHECKED
4:1	WWL 1-3-78	

TITLE: PARTS PLACEMENT

DRAWING NO. 504-175 REV A

FIGURE 3A


TTS DECODER
MA 123
504-176
FL1101
FL1103
FL1102
IC1101
IC1102
IC1103
IC1104
Q1101
Q1102
P1
J1101
8V
4V

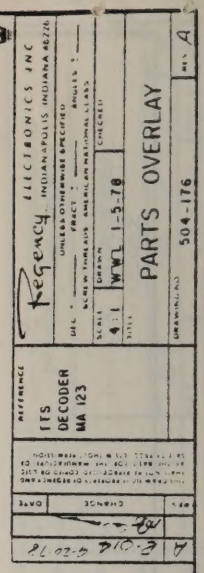

Regency ELECTRONICS INC
INDIANAPOLIS INDIANA 46226
REFERENCE
TTS
DECODER
MA 123
PARTS OVERLAY
504-176
WW1 1-5-78

FIGURE 3B

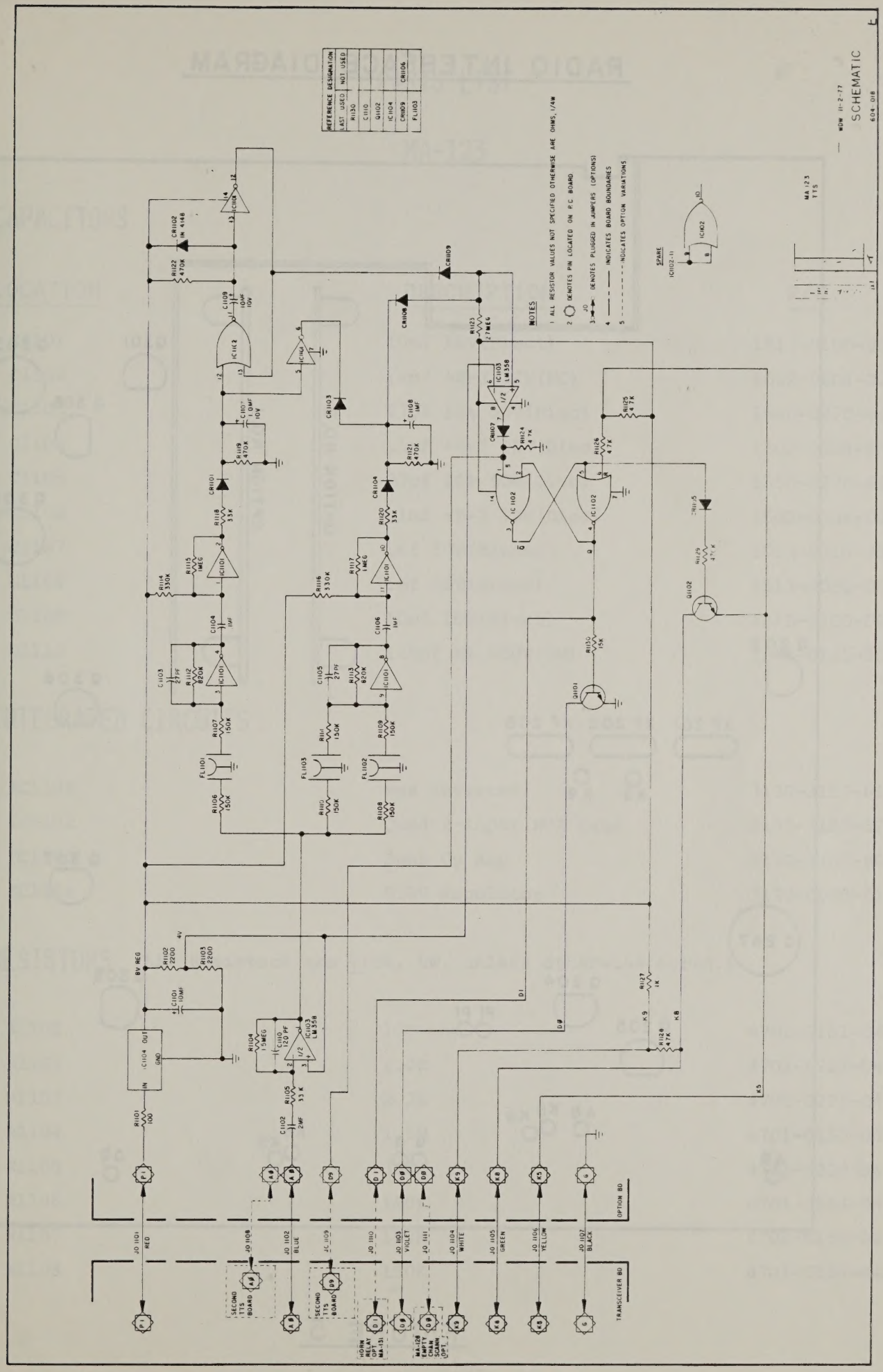

SCHEMATIC
NOTES
1 ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4W
2 DENOTES PIN LOCATED ON P.C. BOARD
3 DENOTES PLUGGED IN JUMPERS (OPTIONS)
4 INDICATES BOARD BOUNDARIES
5 INDICATES OPTION VARIATIONS
REFERENCE DESIGNATION
LAST USED
NOT USED
OPTION BD
TRANSCEIVER BD
SECOND TTS BOARD
HORN RELAY OPT MA-131
MA-128 EMPTY CHAN SCANN OPT
MA 123 TTS
SPARE

FIGURE 4

RADIO INTERFACE DIAGRAM

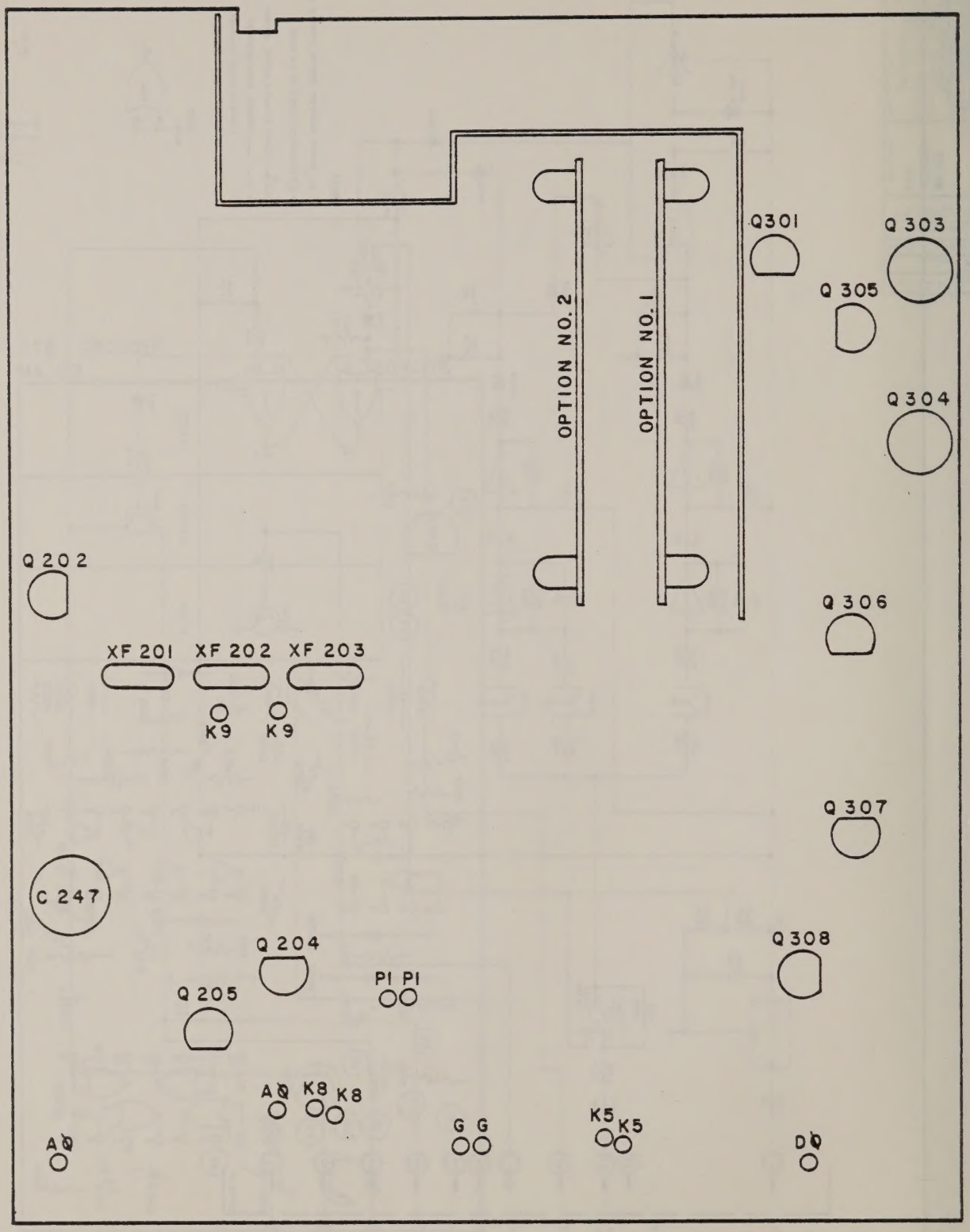


FIGURE 5

PARTS LIST

MA-123

CAPACITORS

LOCATION	DESCRIPTION	P/N
C1101	10mf 16V(Elect)	1513-0100-002
C1102	.2mf +8-2 12V(MC)	1502-0204-006
C1103	27pf 10% 50V(Disc)	1500-0270-650
C1104	.1mf +8-2 12V(Disc)	1502-0104-006
C1105	27pf 10% 50V(Disc)	1500-0270-650
C1106	.1mf +8-2 12V(Disc)	1502-0104-006
C1107	1mf 50V(Elect)	1513-0010-002
C1108	1mf 50V(Elect)	1513-0010-002
C1109	10mf 16V(Elect)	1513-0100-002
C1110	120pf 5% 500V(SM)	1504-0121-505

INTEGRATED CIRCUITS

IC1101	Hex Inverter	3130-3157-617
IC1102	Quad 2-input NOR Gate	3130-3157-627
IC1103	Dual Op Amp	3130-3167-909
IC1104	8.0V Regulator	3130-0000-014

RESISTORS (All Resistors are ±10%, ¼W, unless otherwise noted.)

R1101	100 ohm	4701-0101-042
R1102	2.2K	4701-0222-042
R1103	2.2K	4701-0222-042
R1104	1.5M	4701-0155-042
R1105	33K	4701-0333-042
R1106	150K	4701-0154-042
R1107	150K	4701-0154-042
R1108	150K	4701-0154-042

RESISTORS (cont.)

LOCATION	DESCRIPTION	P/N
R1109	150K	4701-0154-042
R1110	150K	4701-0154-042
R1111	150K	4701-0154-042
R1112	820K	4701-0824-042
R1113	820K	4701-0824-042
R1114	330K	4701-0334-042
R1115	1M	4701-0105-042
R1116	330K	4701-0334-042
R1117	1M	4701-0105-042
R1118	33K	4701-0333-042
R1119	470K	4701-0474-042
R1120	33K	4701-0333-042
R1121	470K	4701-0474-042
R1122	470K	4701-0474-042
R1123	2.7M	4701-0275-042
R1124	4.7K	4701-0472-042
R1125	4.7K	4701-0472-042
R1126	4.7K	4701-0472-042
R1127	1K	4701-0102-042
R1128	47K	4701-0473-042
R1129	1M	4701-0105-042
R1130	15K	4701-0153-042

TRANSISTORS

Q1101	Sil NPN	4801-0000-010
Q1102	Sil NPN	4801-0000-010

DIODES

CR1101-CR1105	Sil	4805-1241-200
CR1107-CR1109	Sil	4805-1241-200